pp. 12, 14 (discharge 80 not submerged in mixing tank and in open communication with outlet 156). Hence the clarification in claim 1 more particularly points out and distinctly defines the invention. The "open" or ambient operating conditions taught by the invention of this patent application is understood by one of skill in the art. Ex. A, paragraphs 10 and 13.

As to claim 2, the Examiner requested clarification of the structural relationship between the third conduit and the mixing tank. The third conduit also comprises "means for discharging the sulphurous acid and unreacted sulphur dioxide gas." Claim 1. The specification identifies such means as discharge opening 80 in the third conduit. Spec., page 14. There is no physical, structural relationship between discharge opening 80 and the mixing tank, thereby permitting the third conduit to be subjected to ambient pressure. The third conduit discharges effluent into the mixing tank, see claim 2. The relationship between the third conduit and the mixing tank is positional, not structural. Spec., page 14.

Furthermore, in claim 2, the structural relationship between the mixing tank and the outlet is already provided. The "mixing tank defin[es] an outlet." Claim 1. This is clearly shown in Fig. 2 as aperture 154 discharging out to ambient conditions. The uncontained nature of the facilitating and maintaining in relation to the mixing tank is adequately described in the specification at page 15 in support of the means plus function claim language. Because the entire apparatus, including the outlet from the mixing tank, is subject to ambient pressure, the facilitating and maintaining means and mixing tank in communication with the outlet are also subject to ambient pressure thereby defining an open system.

The structural relationship between the absorption tower and the mixing tank in claim 3 has been clarified.

Claims 1-4 have been clarified to address the vague and indefinite concerns raised by the Examiner. As amended and explained above, claims 1-4 overcome the section 112 rejections and are understood by one skilled in the art.

Prior Art Issues

The applicant traverses the Examiner's rejection under section 102 and 103. The Allen reference cited by the Office teaches neither the treatment process nor the structure of the claimed invention to one of ordinary skill in the art. Declaration of Dr. Johnson, attached as Ex. A.

There are many distinctions between the teachings of the Allen reference and the present invention. These differences and the associated structure and function of the corresponding apparatus reveal that claims 1 through 4 are not anticipated or rendered obvious by the Allen reference. The claimed acid generator is directed to an oxidation reaction. Unlike the claimed acid generator, the Allen reference teaches a different hydration reaction. This is significant because the structure and process of the oxidation reaction of the claimed acid generator is not taught by the Allen reference. Ex. A, para. 9.

The claimed acid generator starts with a supply of raw sulphur. The sulphur is combusted to create SO_2 at ambient pressure. The SO_2 is then dissolved in ambient temperature water at ambient pressure and creates H_2SO_3 in the host water. This reaction occurs all along the path of the flow of water. The H_2SO_3 reacts with O_2 dissolved in the water at ambient temperature and pressure to form dilute H_2SO_4. This reaction also occurs all along the path of the flow of water. In this way, the sulphur not only contributes to reducing the alkalinity of the water, but its combustion is the very fuel used to initiate the otherwise ambient state reaction. Unlike the claimed acid generator, the Allen reference begins with pressurized sulphuric anhydride (SO_3) in a gas phase from another source ("gases containing the sulphuric anhydride ... enter the apparatus through a pipe 10", Allen, pg. 1, lines 35-39, pg. 3, line 74). The sulphurous anhydride is reacted with "hot hydrogen oxide" or "steam." This reaction occurs under pressure. The sulphurous anhydride and steam are allowed to mix and react in a straight tube 17 "of sufficient length for the completion of the desired reaction." Allen reference, pg. 1, lines 63-65. Ex. A, para. 10.

Unlike the claimed acid generator, after completion of the reaction in tube 17, the Allen references teaches the use of a "cooler or condenser 18." Allen, pg. 1, line 67. This produces a "purity known commercially as chemical purity" "without a distillation treatment." Allen, pg. 1 lines 3-4, 18-19. The pure sulphuric acid is gathered in the base of tower 19 where "a suitable draw-off device, for instance a [stop]cock 20" is located to release chemically pure sulphuric acid. A suction pipe 28 is employed to draw the gases through the system and to prevent the dangers of leaks of "hot strong sulphuric vapors." Allen, pg., lines 20-37. Ex. A. para. 11.

Unlike the Allen reference, the claimed acid generator is directed to a dilute sulphurous acid, comprising principally a host water. The Allen reference process produces a concentrated sulphuric acid without water, that is, no need for distillation to remove unwanted water or other fluids. Ex. A, para. 12.

The claimed acid generator is directed to a process in an open system, occurring under ambient temperature and pressure. Unlike the claimed acid generator, the Allen reference teaches a process under pressure and temperature. Ex. A, para. 13

In summary, the gaseous, hydration reaction of the Allen reference does not teach the oxidation reaction of the claimed acid generator. The Allen reaction is *completed* in tube 17 without any teaching or suggestion of the configuration of containment, blending and agitation zones, a mixing tank and a submersion pool of the claimed acid generator, throughout which portions of the apparatus dilute sulphurous acid continues to be generated at ambient temperature and pressure. Ex. A, para. 14.

As a result, contrary to the initial read of the Examiner, the Allen reference does not have the claimed sulphur dioxide conduit. Allen has a pressurized, heated sulphur anhydride (trioxide) feed pipe. The Allen reference does not teach the claimed water supply and conduit. To the contrary, the Allen references teaches a supply of steam to mix under "high pressure" with the sulphur anhydride. Allen, pg. 3, line 65. The Allen reference does not teach the claimed blending portion zone where

partial oxidation occurs. Allen employs a length of tube in which a hydration reaction is completed. The Allen reference does to teach the claimed containment portion. Similarly, the Allen reference does not teach the claimed agitation portion. The Allen reference necessarily teaches a condenser used to cool and concentrate pure acid because "the heat of formation of H_2So_4 is sufficiently great to maintain the entire mass in the state of a vapor." After all, "it is only when the product is in the form of a vapor that the condensation and collection of the sulphuric acid will proceed ...." The Allen reference teaches that the acid "is withdrawn at the middle of the apparatus, that is to say, between the two coolers [18 and 25]." Allen, page 3, lines 82-84. The present invention discharges after multiple reactions zones at the end of the apparatus. Unlike the present invention, there is no teaching in the Allen reference that the discharge into tank 19 contributes to the further creation of sulphurous acid. Tank 19 collects pure acid and lets gases pass through the tower.

The value of the ambient conditions meets the objects of the invention and serves the need to place the apparatus in the field, often literally, to provide the landowner an efficient, self-contained apparatus to aid the landowner needing water and soil treatment without the required sealed, pressurized processes requiring energy to heat water or the like, such as required by the Allen reference.

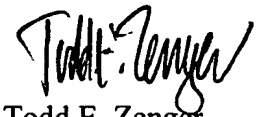
The combination of the Allen reference with the McFarland reference does not overcome the patentable distinctions presented above.

The applicant respectfully requests that claims 1-4, as clarified and amended, overcome all section 112, 102 and section 103 rejections and should be passed to allowance.

If any further impediments to issuance remain, the Examiner is invited to contact the undersigned by telephone at 801-328-3600.

DATED this 27th day of July, 1999.

Respectfully submitted,



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